I use the simple letters, a, A, . . to denote (linear or angular) distances measured in the ordinary manner; and the same letters with a superscript stroke $\bar{a}$, $\bar{A}$, . . to denote the same distances measured according to the theory. The radius of the Absolute is for convenience taken to be $= 1$; the distance of any point from the center can, therefore, be represented as the sine of an angle.

The distance $\overline{BC}$, or say $\bar{a}$, of any two points B, C is by definition as follows:

$$\bar{a} = \tfrac{1}{2} \log \frac{BI \cdot CJ}{\overline{BJ \cdot CI}}$$

(where I, J are the intersections of the line BC with the circle).

As for the trigonometry "the formulæ are, in fact, similar to those of spherical trigonometry with only cosh $\bar{a}$, sinh $\bar{a}$, etc., instead of cos a, sin a, etc."

Cayley returned again to this matter in his celebrated Presidential Address to the British Association (1883), saying there: "It is well known that Euclid's twelfth axiom, even in Playfair's form of it, has been considered as needing demonstration; and that Lobatschévsky constructed a perfectly consistent theory, wherein this axiom was assumed not to hold good, or say a system of non-Euclidean plane geometry. There is a like system of non-Euclidean solid geometry."

"But suppose the physical space of our experience to be thus only approximately Euclidean space, what is the consequence which follows?"

The very next year this ever-interesting subject recurs in the paper (May 27, 1884) 'On the Non-Euclidean Plane Geometry.' "Thus the geometry of the pseudo-sphere, using the expression straight line to denote a geodesic of the surface, is the Lobatschévskian geometry; or, rather, I would say this in regard to the metrical geometry, or trigonometry, of the surface; for in regard to the descriptive geometry the statement requires some qualification * * * this is not identical with the Lobatschévskian geometry, but corresponds to it in a manner such as that in which the geometry of the surface of the circular cylinder corresponds to that of the plane. I would remark that this realization of the Lobatschévskian geometry sustains the opinion that Euclid's twelfth axiom is undemonstrable."

But here this necessarily brief notice must abruptly stop. Cayley, in addition to his wondrous originality, was assuredly the most learned and erudite of mathematicians. Of him in his science it might be said he knew everything, and he was the very last man who ever will know everything. His was a very gentle, sweet character. Sylvester told me he never saw him angry but once, and that was (both were practicing law!) when a messenger broke in on one of their interviews with a mass of legal documents—new business for Cayley. In an access of disgust, Cayley dashed the documents upon the floor.

GEORGE BRUCE HALSTED.

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Commercial Organic Analysis. A treatise on the properties, proximate analytical examination, and modes of assaying the various organic chemicals and products employed in the arts, manufactures, medicine, with concise methods for the detection and determination of their impurities, adulterations and products of decomposition. By ALFRED H. ALLEN, F. I. C., F. C. S. Third Edition. Illustrated. With revisions and addenda by the author and HENRY LEFFMANN, M.A., M.D. Philadelphia, P. Blakiston's Son & Co. 1898. Volume I., Introductions, alcohols, neutral alcoholic derivatives, sugars, starch and its isomers, vegetable acids, etc.; pp. xii+557; Price, $4.50. Volume IV., The proteids and albuminous principles; Second Edition; pp. xi+584; Price, $4.50.

The immediate reason for the present publication of the first volume of the third edition of this well-known work has been the appearance of an unauthorized reprint of the second edition. As the second edition was printed in 1885 it is out of date on some points, and many desirable additions and corrections have been made, partly by Mr. Allen, partly by Dr. Leffmann. The plan of the book not only includes careful directions for the analysis of commercial organic substances, and in many cases a discussion of various methods which have been proposed,

but it also gives very many illustrations of actual cases of adulteration, and of difficult problems in analysis which have come under the observation of the author and of others. These features of the work make it almost indispensable for any chemist who has occasion to make analyses in this field. Any one interested in organic chemistry, indeed, will find very many things in the work which are valuable and useful.

In a work of such extent, and especially in one which has grown to its present form during many years under the hands of a busy analyst, it would be impossible that there should not be some things which do not correspond to the best present knowledge. Thus, the same principle which led the author to give Victor Meyer's air-displacement method for the determination of molecular weights should have been the occasion for giving the freezing-point and boiling-point methods, which would be much more generally useful for analytical purposes. On p. 210 arsenic (from the red phosphorus used in its preparation) should have been given as an impurity to be looked for in ethyl bromide. On p. 247 arabinose is incorrectly given as a hexose. On p. 342 'alumina cream' is given as a reagent with a reference to p. 357, but directions for its preparation cannot be found on that page or by means of the index. Some other criticisms of a similar sort might be made, but it would be a thankless task for a reviewer to select, among thousands of statements which are correct and valuable, a few which might be improved.

The fourth volume is the last of the second edition. It discusses the analysis of proteids and albuminous principles. The first portion of the book gives the classification and general analytical reactions of the proteids. Then follow directions for the analytical examination of the proteids of eggs, blood plasma, urine, plants, milk, meat, of digestion (pepsin, peptones, etc.) and of blood. Under the head of proteoïds or albuminoïds, such substances as gelatine, glue, silk, hair and wool are considered. The following statement from the preface is especially significant: "I may here repeat that I am fully conscious that much of the matter of Volume IV. is scarcely such as might be expected to be contained in a work purporting to treat of Commercial Analysis, but I have thought it better to include all facts possessing for me an analytical or practical interest, believing that what I find useful myself will also be of value or interest to others." It is just because Mr. Allen has made these books inclusive rather than exclusive that they prove so useful to the experienced chemist.

W. A. Noyes.

Sewerage: The Designing, Construction and Maintenance of Sewerage Systems. By A. Prescott Folwell. New York, John Wiley & Sons. 1898. 8vo. Pp. x+372. Price, $3.00.

The whole subject of sewerage is naturally divided into three parts: first, the plumbing and drainage of houses; second, the street conduits and their appurtenances; third, the disposal and purification of the sewage. This volume deals with the second part of the subject almost exclusively, only seven pages being devoted to the first and sixteen pages to the third. The facts and discussions are hence mainly from the point of view of the constructing engineer rather than from the sanitary side, and the object is to give directions for building an efficient plant for the removal of sewage from a town and maintaining it in proper repair and cleanliness. This object is accomplished in a very satisfactory manner.

The use of cesspools as a receptacle for the refuse of houses is severely condemned; the author has found the soil of a city street colored black by the liquid from a cesspool 75 feet distant, which must have passed under or around the cellar of a house. The pail systems of removal, used somewhat in France and England, as also the earth-closet system, are regarded as vastly preferable to the cesspool and privy methods which are so generally used in villages, and it is recommended that towns without a water supply should introduce them as a temporary measure. Towns having a good supply of water should introduce a water-carriage system in preference to all other methods on account of its great sanitary advantages.

The two water-carriage systems in common use, called the combined system and the separate system, are described and compared, and